greater than the first dopant gas flow rate, in an atmosphere of a second temperature that is lower than the first temperature.

6. A method of producing a semiconductor substrate, the method comprising:

a first epitaxial layer forming step of forming a first epitaxial layer by introducing a dopant gas of a first conductivity type to a semiconductor substrate of the first conductivity type;

a trench forming step of forming a trench in the first epitaxial layer;

a second epitaxial layer forming step of forming a second epitaxial layer on the first epitaxial layer and in the trench, by introducing a dopant gas of a second conductivity type that is different from the first conductivity type at a predetermined first dopant gas flow rate, in an atmosphere of a predetermined first temperature; and

a third epitaxial layer forming step of forming a third epitaxial layer to fill up the trench, by introducing the dopant gas of the second conductivity type to the second epitaxial layer at a second dopant gas flow rate that is greater than the first dopant gas flow rate, in an atmosphere of a second temperature that is higher than the first temperature.

7. The method of producing a semiconductor substrate according to claim **4**, wherein amount of dopant in the second epitaxial layer, the third epitaxial layer, and the fourth epitaxial layer is changed by changing the flow rate of the dopant gas of the second conductivity type.

8. The method of producing a semiconductor substrate according to claim **4**, wherein amount of dopant in the second epitaxial layer, the third epitaxial layer, and the fourth epitaxial layer is changed by using a plurality of gas cylinders of different concentrations of the dopant gas of the second conductivity type.

9. The method of producing a semiconductor substrate according to claim **4**, wherein at least one of the second epitaxial layer, the third epitaxial layer and the fourth epitaxial layer is formed by feeding a material gas and a halide gas in parallel in the atmosphere.

10. The method of producing a semiconductor substrate according to claim **4**, wherein amount of dopant is substantially the same in the second epitaxial layer, the third epitaxial layer and the fourth epitaxial layer.

11. The method of producing a semiconductor substrate according to claim **4**, wherein a flow rate of a halide gas in the atmosphere is greater in the third epitaxial layer forming step than in the second epitaxial layer forming step and the fourth epitaxial layer forming step.

12. A semiconductor substrate, wherein the semiconductor substrate is manufactured by the method of producing a semiconductor substrate according to claim **1**.

13. A semiconductor device, wherein the semiconductor substrate according to claim **12** is used.

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